

Listing of Claims

- 1 1. (Original) An image processing system suited for post-processing compressed
2 and decompressed images, the system comprising:
3 a region segmenter configured to sub-divide data representing at least one image frame to
4 generate a plurality of image regions;
5 an artifact detector configured to analyze each of the plurality of image regions for the
6 existence of an image artifact, the artifact detector further configured to identify regions
7 containing an image artifact;
8 a filter configured to receive an indication of image regions containing an image artifact
9 from the artifact detector, wherein the filter smooths at least one picture element data value in
10 accordance with at least one viewer selected parameter to generate modified picture element
11 data; and
12 an output memory communicatively coupled with the input memory and with the filter
13 wherein the output memory assembles an image artifact reduced image frame comprising
14 unmodified picture element data from the at least one image frame and smoothed picture element
15 data to generate an artifact reduced representation of the at least one image frame.
- 1 2. (Original) The system of claim 1, wherein the region segmenter sub-divides the at
2 least one image frame in response to a viewer selected region sensitivity value.
- 1 3. (Original) The system of claim 1, wherein the artifact detector applies at least one
2 statistical test to the picture element data values comprising the region to identify when the
3 region contains an image artifact.
- 1 4. (Original) The system of claim 1, wherein the filter selectively smooths picture
2 element data values comprising the region in response to a block sensitivity parameter and a
3 picture element data value comparison threshold.
- 1 5. (Original) The system of claim 1, wherein the filter comprises an edge-preserving
2 low-pass filter.

1 6. (Original) The system of claim 1, further comprising:
2 a communications port configured to receive the at least one viewer selected imaging
3 parameter; and
4 a controller communicatively coupled with the communications port wherein the
5 controller is configured to control the flow of picture elements in response to the at least one
6 viewer selected imaging parameter.

1 7. (Original) The system of claim 1, further comprising:
2 a delay module configured to receive a decompressed audio signal, wherein the delay
3 module synchronizes the image artifact reduced image frame with the decompressed audio
4 signal.

1 8. (Original) The system of claim 2, wherein the viewer selected region sensitivity
2 value defines a plurality of picture elements equivalent to the square of the region sensitivity
3 value.

1 9. (Original) The system of claim 3, wherein the at least one statistical test
2 comprises a mean picture element data value.

1 10. (Original) The system of claim 4, wherein the filter smoothes picture element
2 data values when both the absolute value of the difference between picture element data values
3 for adjacent picture elements exceeds the picture element data value comparison threshold and
4 wherein the compared picture elements form a block boundary as defined by the square of a
5 block sensitivity value.

1 11. (Original) The system of claim 4, wherein the block sensitivity parameter and the
2 picture element data value comparison threshold are viewer selected.
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4 12. (Original) The system of claim 9, wherein an absolute value of the difference
5 between the mean picture element data value and a maximum picture element data value for the

6 region provides a first interim result, and wherein an absolute value of the first interim result is
7 compared with an image artifact detection threshold.

1 13. (Original) The system of claim 9, wherein an absolute value of the difference
2 between the mean picture element data value and a minimum picture element data value for the
3 region provides a second interim result, and wherein an absolute value of the second interim
4 result is compared with an image artifact detection threshold.

1 14. (Original) An image processing system suited for post-processing compressed
2 and decompressed images, the system comprising:

3 means for analyzing data associated with a plurality of picture elements comprising at
4 least one image frame to identify portions of the at least one image frame that contain image
5 artifacts;

6 means for smoothing at least one data value associated with the plurality of picture
7 elements in the identified sub-portion of the at least one image frame; and

8 means for assembling an image artifact reduced image comprising smoothed picture
9 elements.

1 15. (Original) The system of claim 14, wherein the means for analyzing comprises
2 performing at least one statistical test on the picture element data values on a sub-portion of the
3 at least one image frame.

1 16. (Original) The system of claim 14, wherein the means for smoothing comprises a
2 mathematical combination of a picture element of interest with an adjacent picture element in a
3 first direction to form a first smoothing result, followed by a mathematical combination of the
4 picture element of interest with an adjacent picture element in a second direction using the first
5 smoothing result for the picture element of interest data value for those cases where the picture
6 element of interest is adjacent to a block as defined by a block sensitivity value.

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2 17. (Original) The system of claim 14, wherein the means for assembling comprises a
3 frame memory device configured to store both unmodified picture element data and modified

4 picture element data, wherein modified picture element data supersedes unmodified picture
5 element data.

1 18. (Original) The system of claim 15, wherein the at least one statistical test
2 comprises determining the mean picture element data value on a sub-portion of the at least one
3 image frame.

1 19. (Original) The system of claim 16, wherein the mathematical combination of a
2 picture element of interest with an adjacent picture element comprises determining the average
3 data value of the picture element of interest and the adjacent picture element and updating the
4 data value of the picture element of interest with the determined average.

1 20. (Original) A method for reducing image artifacts in a compressed and
2 decompressed image, comprising:
3 receiving picture element data associated with at least one image frame;
4 segmenting the at least one image frame into a plurality of regions in accordance with a
5 first viewer selected imaging parameter;
6 analyzing the plurality of segmented regions to identify regions that contain an image
7 artifact in response to a second viewer selected imaging parameter;
8 processing the identified regions with an adaptive filter such that at least one picture
9 element data parameter is adjusted in response to both a third and a fourth viewer selected
10 imaging parameters; and
11 inserting adjusted picture element data values into the at least one image frame.

1 21. (Original) The method of claim 20, wherein the first viewer selected imaging
2 parameter applied in the segmenting step comprises a region sensitivity value.

1 22. (Original) The method of claim 20, wherein the second viewer selected imaging
2 parameter applied in the analyzing step comprises an image artifact detection threshold.

1 23. (Original) The method of claim 20, wherein the third and the fourth viewer
2 selected imaging parameters applied in the processing step comprise a block sensitivity value,
3 and a picture element comparison threshold, respectively.

1 24. (Original) A method for smoothing at least one data value associated with a
2 plurality of picture elements containing image artifacts introduced in a compressed and
3 decompressed image, comprising:

4 setting a plurality of counters and a plurality of thresholds in response to a plurality of
5 viewer selected imaging parameters;

6 systematically comparing each of a plurality of picture element data values with a data
7 value associated with an adjacent picture element in a first direction to generate a first interim
8 result, further comparing the first interim result with a first viewer selected imaging parameter,
9 selectively modifying the data value for a picture element of interest to generate a temporary
10 picture element data value when the compared picture elements traverse a block boundary as
11 defined by a second viewer selected imaging parameter;

12 inserting temporary picture element data values; and

13 systematically comparing each of the plurality of picture element data values, including
14 the inserted temporary picture element data values with an adjacent picture element in a second
15 direction to generate a second interim result, further comparing the second interim result with a
16 first viewer selected imaging parameter, selectively modifying the data value for a picture
17 element of interest to generate a final picture element data value when the compared picture
18 elements traverse a block boundary as defined by a second viewer selected imaging parameter.

1 25. (Original) The method of claim 24, wherein the steps of comparing are
2 responsive to a first viewer selected imaging parameter comprising a smoothing threshold.

1 26. (Original) The method of claim 24, wherein the steps of comparing are
2 responsive to a second viewer selected imaging parameter comprising a block sensitivity value.

1 27. (Previously Presented) A method for identifying image artifacts introduced in a
2 compressed and decompressed sub-region of an image, comprising:

3 performing at least one statistical test over a plurality of picture element data values
4 comprising the sub-region to generate a test result;
5 determining a maximum picture element data value for the sub-region; and
6 determining when the absolute value of the difference between the maximum picture
7 element data value and the test result exceeds a predetermined threshold.

1 28. (Currently Amended) The method of claim 27, wherein the step of determining a
2 maximum picture element is replaced with determining a minimum picture element data value
3 for the sub-region and the ~~step of~~ determining when the absolute value of the difference between
4 the maximum picture element data value and the test result is replaced by determining when the
5 absolute value of the difference between the minimum picture element data value and the test
6 result exceeds a predetermined threshold.

1 29. (Canceled)

1 30. (Previously Presented) An image processing system suited for post-processing
2 compressed and decompressed images, the system comprising:
3 means for analyzing data associated with a plurality of picture elements comprising at
4 least one image frame to identify portions of the at least one image frame that contain image
5 artifacts, the means for analyzing data comprising a region sensitivity value;
6 means for smoothing at least one data value associated with the plurality of picture
7 elements in the identified sub-portion of the at least one image frame; and
8 means for assembling an image artifact reduced image comprising smoothed picture
9 elements.

1 31. (Previously Presented) The system of claim 30, wherein the means for analyzing
2 comprises performing at least one statistical test on the picture element data values on a sub-
3 portion of the at least one image frame.

1 32. (Previously Presented) The system of claim 30, wherein the means for smoothing
2 comprises a mathematical combination of a picture element of interest with an adjacent picture

3 element in a first direction to form a first smoothing result, followed by a mathematical
4 combination of the picture element of interest with an adjacent picture element in a second
5 direction using the first smoothing result for the picture element of interest data value for those
6 cases where the picture element of interest is adjacent to a block as defined by a block sensitivity
7 value.

1 33. (Previously Presented) A method for reducing image artifacts in a compressed
2 and decompressed image, comprising:
3 receiving picture element data associated with at least one image frame;
4 segmenting the at least one image frame into a plurality of regions in accordance with a
5 first viewer selected imaging parameter, the first viewer selected imaging parameter comprising a
6 region sensitivity value;
7 analyzing the plurality of segmented regions to identify regions that contain an image
8 artifact in response to a second viewer selected imaging parameter;
9 processing the identified regions with an adaptive filter such that at least one picture
10 element data parameter is adjusted in response to both a third and a fourth viewer selected
11 imaging parameters; and
12 inserting adjusted picture element data values into the at least one image frame.

1 34. (Previously Presented) The method of claim 33, wherein the second viewer
2 selected imaging parameter applied in the analyzing step comprises an image artifact detection
3 threshold.

1 35. (Previously Presented) The method of claim 33, wherein the third and the fourth
2 viewer selected imaging parameters applied in the processing step comprise a block sensitivity
3 value, and a picture element comparison threshold, respectively.